

CLAIMS

We Claim:

1. A system for cleaning a reticle used in photolithographic processing of microelectronic workpieces, the reticle including a plate with a photomask and a pellicle frame around the photomask, wherein the system comprises:
 - a fixture configured to carry the plate;
 - a lid spaced apart from the fixture, wherein the lid has an interface surface configured to seal against at least one of the plate and/or the pellicle frame; and
 - at least one fluid dispenser configured to dispense a fluid onto the pellicle frame.
2. The system of claim 1 wherein the lid comprises a rigid cover having a rim configured to surround the photomask and a seal defining the interface surface extending from the rim.
3. The system of claim 1 wherein the lid comprises a rigid cover, a rim depending from the cover that defines a recess, an end surface around the rim, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate.
4. The system of claim 1 wherein the lid comprises a rigid cover, an edge surface around the cover, a groove in the edge surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the pellicle frame.
5. The system of claim 1 wherein the lid comprises an inflatable bladder that presses against the pellicle frame and has a recess aligned with the photomask.
6. The system of claim 1, further comprising a clamping assembly to press the interface surface against the plate.

7. The system of claim 1, further comprising a vacuum assembly coupled to a hole in the plate to draw the interface surface against the plate.

8. The system of claim 1 wherein:

the lid comprises a rigid cover, a rim depending from the cover that defines a recess, an end surface around the rim, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate; and

the system further comprises a clamping assembly to press the interface surface against the plate.

9. The system of claim 1 wherein:

the lid comprises a rigid cover, a rim depending from the cover that defines a recess, an end surface around the rim, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate; and

the system further comprises a vacuum assembly coupled to a hole in the plate to draw the interface surface against the plate.

10. A system for cleaning a reticle used in photolithographic processing of microelectronic workpieces, the reticle including a plate with a photomask and a pellicle frame around the photomask, wherein the system comprises:

a holder configured to carry the reticle; and

a cover having rigid casing and a seal, wherein the casing has a rim and an interior cavity within the rim that is configured to encase the photomask, and wherein the seal is carried by the casing to seal against at least one of the plate and/or the pellicle frame around the photomask; and

at least one fluid dispenser configured to dispense a fluid onto the pellicle frame.

11. The system of claim 10 wherein the cover further comprises an end surface around the rim and a groove in the end surface, and wherein the seal is in the groove.

12. The system of claim 10, further comprising a clamping assembly to press the seal against the plate.

13. The system of claim 10, further comprising a vacuum assembly coupled to a hole in the plate to draw the seal against the plate.

14. The system of claim 10 wherein:

the cover further comprises an end surface around the rim and a groove in the end surface, and wherein the seal is in the groove; and

the system further comprises a clamping assembly to press the seal against the plate.

15. A system for cleaning a reticle used in photolithographic processing of microelectronic workpieces, the reticle including a plate with a photomask and a pellicle frame around the photomask, wherein the system comprises:

a holder configured to carry the reticle;

a lid spaced apart from the holder, the lid having an interface surface that forms a barrier between the photomask and the pellicle frame; and

at least one fluid dispenser configured to direct a fluid onto the pellicle frame.

16. The system of claim 15, wherein the lid comprises a rigid cover, a rim depending from the cover that defines a recess, an end surface around the rim, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate.

17. The system of claim 15, wherein the lid comprises a rigid cover, an edge surface around the cover, a groove in the edge surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the pellicle frame.

18. The system of claim 15 wherein:

the lid comprises a rigid cover, a rim depending from the cover that defines a recess, an end surface around the rim, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate; and

the system further comprises a clamping assembly to press the interface surface against the plate.

19. A system for cleaning a reticle used in photolithographic processing of microelectronic workpieces, the reticle including a plate with a photomask and a pellicle frame around the photomask, wherein the system comprises:

a holder configured to carry the reticle; and

a cover having rigid casing and a seal, wherein the casing has a rim and an interior cavity within the rim that is configured to encase the photomask, and wherein the seal is carried by the casing to seal against at least one of the plate and/or the pellicle frame around the photomask.

20. A system for cleaning a reticle used in photolithographic processing of microelectronic workpieces, the reticle including a plate with a photomask and a pellicle frame with a rim around the photomask, wherein the system comprises:

a holder configured to carry the reticle; and

a cover configured to form a fluid barrier between the photomask and the pellicle frame exposed.

21. The system of claim 20 wherein the cover comprises a rigid casing having a foot configured to surround the photomask and a seal defining an interface surface extending from the foot.

22. The system of claim 20 wherein the cover comprises a rigid casing, a foot depending from the casing that defines a recess, an end surface around the foot, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate.

23. The system of claim 20, further comprising a clamping assembly to press a portion of the cover against the plate.

24. The system of claim 20, further comprising a vacuum assembly coupled to a hole in the plate to draw a portion of the cover against the plate.

25. The system of claim 20 wherein:

the cover comprises a rigid casing, a foot depending from the casing that defines a recess, an end surface around the foot, a groove in the end

surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate; and

the system further comprises a clamping assembly to press the interface surface against the plate.

26. A system for cleaning a reticle used in photolithographic processing of microelectronic workpieces, the reticle including a plate with a photomask and a pellicle frame around the photomask, wherein the system comprises:

a holder configured to carry the reticle;

a cover having casing and a seal, wherein the casing has a panel and a rim depending from the panel to define an interior cavity within the rim that is configured to encase the photomask, and wherein the seal is carried by the casing to seal against at least one of the plate and/or the pellicle frame around the photomask; and

a securing mechanism for releasably holding the cover to the reticle.

27. A system for cleaning a reticle used in photolithographic processing of microelectronic workpieces, the reticle including a plate with a photomask and a pellicle frame with an upper edge around the photomask, wherein the system comprises:

a holder configured to carry the reticle;

a cover configured to form a fluid barrier around the photomask without covering the upper edge of the pellicle frame; and

a securing mechanism for releasably holding the cover to the reticle.

28. The system of claim 27 wherein the cover comprises a rigid casing having a rim configured to surround the photomask and a seal defining an interface surface extending from the rim.

29. The system of claim 27 wherein the cover comprises a rigid panel, a rim depending from the panel that defines a recess, an end surface around the rim, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate.

30. The system of claim 27, further comprising a clamping assembly to press a portion of the cover against the plate.

31. The system of claim 27, further comprising a vacuum assembly coupled to a hole in the plate to draw a portion of the cover against the plate.

32. The system of claim 27 wherein:

the cover comprises a rigid panel, a rim depending from the panel that defines a recess, an end surface around the rim, a groove in the end surface, and a seal in the groove, and wherein the seal defines an interface surface that contacts the plate; and

the system further comprises a clamping assembly to press the interface surface against the plate.

33. In the fabrication of microelectronic devices, a method for cleaning a reticle having a plate, a photomask in the plate, and a pellicle frame around the photomask, the method comprising:

sealing a cover around the photomask so that a portion of the pellicle frame remains exposed; and

dispensing a cleaning fluid onto the exposed portion of the pellicle frame.

34. The method of claim 33, wherein sealing includes surrounding the photomask with the cover, the cover having a rigid rim and a seal extending from the rim.

35. The method of claim 33, wherein sealing includes encasing the photomask with the cover, the cover having a rigid casing and a seal, the casing having a rim and an interior cavity within the rim, and wherein the seal is carried by the casing to seal against the plate.

36. The method of claim 33, wherein sealing includes defining an interface surface between the plate and a seal, the seal being in a groove of an end surface around a rigid rim of the cover, the cover defining a recess.

37. The method of claim 33, wherein sealing includes defining an interface surface between the pellicle frame and a seal, the seal being in a groove in an edge surface of a rigid rim of the cover.

38. The method of claim 33, wherein sealing includes pressing a cover against the pellicle frame with an inflatable bladder, and wherein the cover has a recess aligned with the photomask.

39. The method of claim 33, wherein sealing includes clamping the cover to the plate.

40. The method of claim 33, wherein sealing includes drawing the cover to contact the plate using a vacuum assembly coupled to a hole in the plate.

41. The method of claim 33, wherein
sealing includes defining an interface surface between the plate and a seal, the seal being in a groove of an end surface around a rigid rim of the cover, the cover defining a recess; and

further comprising clamping the cover to the plate.

42. The method of claim 33, wherein
sealing includes defining an interface surface between the plate and a seal, the seal being in a groove of an end surface around a rigid rim of the cover, the cover defining a recess; and

further comprising drawing the cover to contact the plate using a vacuum assembly coupled to a hole in the plate.

43. The method of claim 33, wherein sealing includes forming a fluid barrier between the photomask in the plate and the pellicle frame.

44. In the fabrication of microelectronic devices, a method for cleaning a reticle comprising:

mounting the reticle to a holder;

disposing a cover relative to the reticle to form a fluid barrier between a photomask in the reticle and a pellicle frame around the photomask; and

dispensing a cleaning fluid onto the pellicle frame.

45. The method of claim 44, further comprising sealing the photomask to the cover, the cover including a rigid rim and a seal extending from the rim.

46. The method of claim 45, wherein sealing includes defining an interface surface between the reticle and the seal, the seal being in a groove of an end surface around the rigid rim of the cover, the cover defining a recess.

47. The method of claim 44, wherein disposing includes defining an interface surface between the pellicle frame and a seal, the seal being in a groove, the groove being in an edge surface, and the edge surface being of a rigid rim of the cover.

48. The method of claim 44, wherein disposing includes pressing the cover against the pellicle frame with an inflatable bladder, and wherein the cover has a recess aligned with the photomask.

49. The method of claim 44, wherein disposing includes clamping the cover to the reticle.

50. The method of claim 44, wherein disposing includes drawing the cover to contact the reticle using a vacuum assembly coupled to a hole in the reticle.

51. The method of claim 44, wherein
disposing includes defining an interface surface between the reticle and a seal, the seal being in a groove of an end surface around a rigid rim of the cover, the cover defining a recess; and

further comprising clamping the cover to the reticle.

52. The method of claim 44, wherein
disposing includes defining an interface surface between the reticle and a seal, the seal being in a groove of an end surface around a rigid rim of the cover, the cover defining a recess; and

further comprising drawing the cover to contact the reticle using a vacuum assembly coupled to a hole in the reticle.

53. A method for cleaning a reticle, comprising:
isolating the area from the pellicle frame; and

directing at least one fluid source to spray a fluid onto the reticle.

54. The method of claim 53, wherein the fluid is capable of removing adhesive from the pellicle frame.

55. The method of claim 53, further including rotating the base.

56. A photomask cleaning cover, comprising:

at least one panel, wherein the panel includes a distal surface defining a recessed area of sufficient size to isolate a photomask region on a reticle from a pellicle frame located on the reticle;

a seal extending along the circumference of the distal surface.

57. A system for protecting a photomask area of a reticle, comprising:

means for carrying the reticle, the reticle having a surface, wherein a pellicle frame is attached to the surface defining the photomask area;

means for forming a barrier between the photomask area and the pellicle frame; and

means for dispensing at least one fluid onto the reticle.

58. The system of claim 57, wherein the barrier means includes a casing configured to cover the photomask area without covering the pellicle frame.

59. The system of claim 57, wherein the barrier means includes a cover sealed to the reticle in a manner that prevents the fluid from contacting the photomask area.

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